



EXPERIMENTAL VEHICLE

HOLDEN TORANA GTR-X ENGINEERING REPORT

Appearances notwithstanding, the Torana GTR—X is a car in the tradition of the first Holden.

The common denominator is innovation.

In 1948 the first Holden introduced to Australia a new passenger car concept — a medium price, medium size six cylinder vehicle designed and built specifically for the Australian market.

Since then that market has changed. It is bigger, more affluent, more diverse and open to the products of all the world's major carmakers.

GMH and the Holden range have grown and developed with the market, anticipating changing needs and preferences and breaking much new ground in both manufacturing techniques and capability and product development. Local manufacture of V8 engines and automatic transmissions, and the introduction of the Monaro coupe and six cylinder Torana reflect this growth.

Torana GTR—X is an exploration of yet another opportunity for GMH initiative in model diversification. It has been built to help assess the market in Australia for a locally designed and built 2-seater enthusiasts' car.

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DEVELOPMENT AND HISTORY

In July, 1969, the GMH Research and Development and Advanced Styling Groups began a new joint program. The target, an advanced design 2-seater sports car — capable of limited volume production on low cost tooling — of sports car performance, exceptional ride and handling quality and unique styling characteristics.

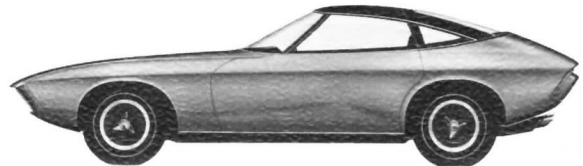
An all fibreglass body, mounted on a full steel frame was chosen. The use of fibreglass for the body provided complete styling freedom. After numerous "package studies" and blackboard styling drawing proposals the final concept emerged — a car of clean, aerodynamic styling with a long, sleek hood and concealed headlights, low wedge shape body and attractive rear end styling, enhanced by an elevated tail light assembly.

Final development of all surfaces, lines and detail features such as doors, glass, front and rear lights etc. required a full size clay model and this was begun in October, 1969.

To enhance the overall styling, some refinements were made of the vehicle's exterior. Side panel sculpting was removed to streamline the profile; the windshield angle was altered; the roof and door lines were substantially changed.



Styling proposal



Selected styling proposal



Clay model progress



Clay with side sculpting



Refined clay model



Completed vehicle

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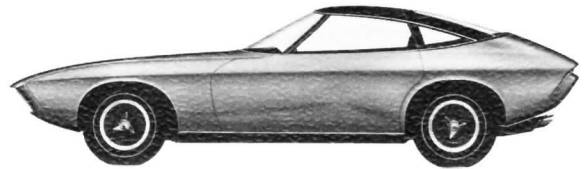
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Parallel with exterior styling, design studies of the interior were prepared. As soon as dimensions were stabilised, clay bucks of the passenger compartment complete in every detail of dash panel and instrumentation, console, inner door styling and seats were built.

Studies were constantly made to improve location, quality and practicability of the dash layout and the comfort and design of the seating.

During this period R. & D. engineers and designers were translating styling lines into body components and were designing all mechanical components. Extensive use was made of current production components and parts.

Comprehensive studies were made to ensure that the vehicle would comply with, and wherever possible exceed, current and known future safety requirements and design rules.

By April 1, manufacture of all body and mechanical parts was complete and final assembly of the vehicle was under way.

The vehicle was then transported to the GMH Proving Ground for general evaluation, extensive ride and handling, brake and performance testing.



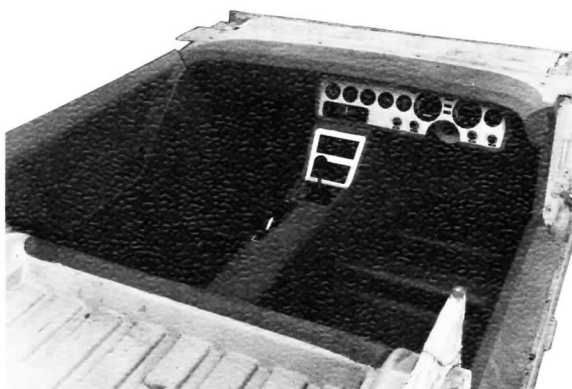
Clay model prior to body manufacture



Clay model being loaded prior to fibreglass body manufacture



Development work on body and mechanicals



Clay buck of interior



Engineering development

DIMENSIONS

The GTR—X has an overall length of 164.5" with a maximum width of 68.2". Overall height is 44.7". The wheelbase is 94.0" with front tread of 54.0" and rear tread of 55.0".

Minimum ground clearance is 5.0" and the overall kerb weight is 2,300 lbs.

EXTERIOR STYLING

Distinctive GTR—X styling characteristics include a black air inlet scoop set deep beneath a body contour bumper. The bumper protects large wrap around parking and turn lights. Headlamps are concealed to avoid interruption of the long sloping lines of the hood and fenders.



The windshield is raked sharply to the roof line, which joins the rear end in an aerodynamic fastback form housing a swing-up luggage access door.



Sidestyling features a strong highlight accent which sweeps upward from the front bumper to the rear end. This is complemented by an undercut sculptured line running from the bumper, down the black rocker panel and up at the rear to accentuate the concave panel across the rear end.



Exterior ornamentation is minimal. The GTR—X identification is in decal form within the black and orange stripe that parallels the rocker panel and continues from the rear wheel opening past the bumper. The tail lamp assembly is contoured to fit snugly and functionally into the rear accent panel.

The rear end, free from interruption save for the protective bumper, curves underneath hiding the mechanicals and giving smooth air flow.

Flush petrol filler access door and recessed door handles enhance the clean, functional lines of the GTR—X.



The two piece wheel covers consist of a centre hub secured by five chrome crown nuts and an outer plain chrome ring attached to the periphery of the wheel.

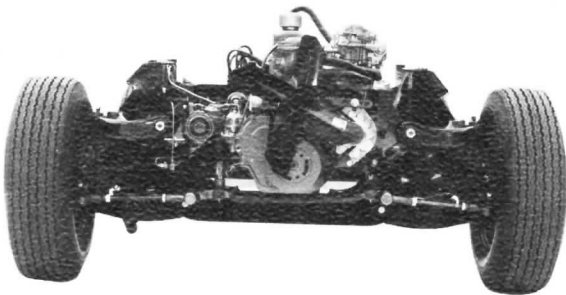
CHASSIS

The chassis frame is a welded box section (5" high and 3" mean width) full perimeter type with welded in central and rear box section crossmembers. The front crossmember with triangulated strut is bolted at five reinforced places to frame side members.



Front Suspension:

Independent type short and long arm, coil spring front suspension. The box section one piece cross member and compressional strut type front suspension as used on current Torana vehicles has been widened to suit the wider front track. The rearward extension arms are welded to the crossmember with the complete assembly bolted to the frame at four points.



The front crossmember is used with standard steering knuckles, ball joints, upper and lower control arms. New front springs are similar to current design but with load and rate revised to suit design characteristics.

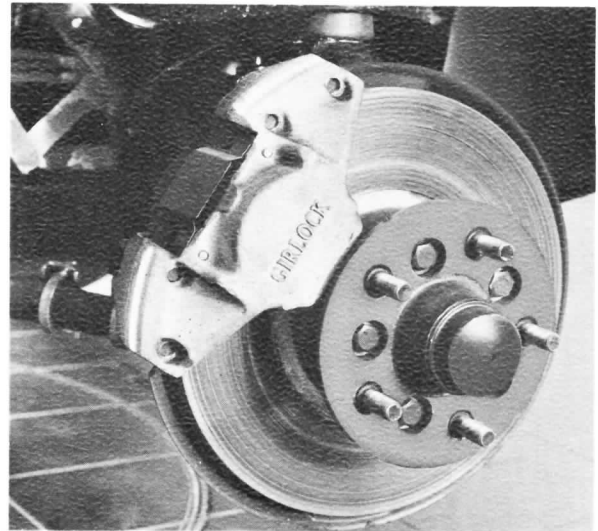
Rear Suspension and Axles:

Rear suspension is of the four link type, consisting of two longitudinal lower outer links incorporating mounts for coil springs and two diagonal inner upper links located for maximum lateral control. Rear shock absorbers are mounted close to the wheels and forward of axle.

Rear axle ratio is 3.36:1 with limited slip differential fitment. Conventional propellor shaft of 2.75" diameter is fitted with sealed universal joints and sliding yoke on transmission main shaft.

Brakes:

4 wheel disc brakes, vacuum boosted. Front wheel discs of 10" diameter, rear discs of 9 1/4" diameter with integral self adjusting hand brake. A new tandem master cylinder assembly complete with pressure differential electric warning system. A brake failure warning system is built into the master cylinder.



10" disc brake

Wheels and Tyres:

Wheels are 13 x 5.5 JJ and tyres C70—13 4 P/R. Wheels have safety rims incorporated in both inner and outer flanges.

Fuel Tank:

12.0 gallon capacity fuel tank with recess shaped to accommodate spare wheel. Fuel tank is filled with polyurethane foam to prevent swishing of fuel.

Steering:

Recirculating ball with parallel linkage. Energy absorbing steering column fitted with steering wheel tilt mechanism. Forged steering linkage to suit design installation. Steering wheel of 14" diameter.

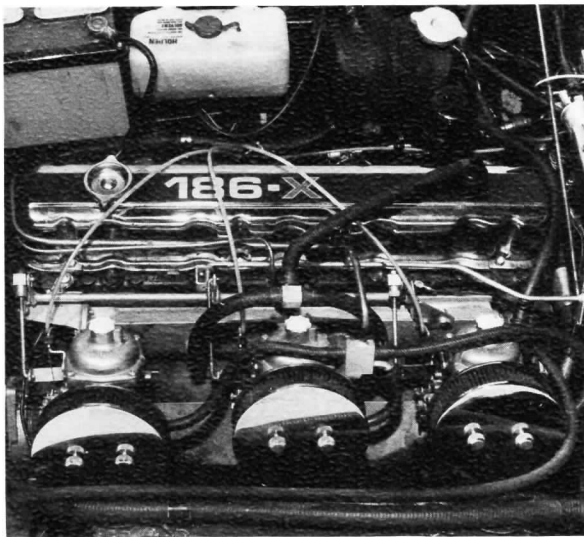
Electrical:

44 amp hour light-weight battery mounted on a tray moulded into the engine compartment on right side. Front lamps are high beam 75 watts, low beam 60 watts. All wiring is standard insulated automotive plastic L.T. cable. Lamp holders for secondary exterior lighting are moulded plastic with accessible ground terminals. The wiring harness modules are engine; lighting; right door; left door; firewall; instrument panel; body; and rear licence lamp harness. A lamp-fail system continuously monitors front and rear lamps while ignition is on.

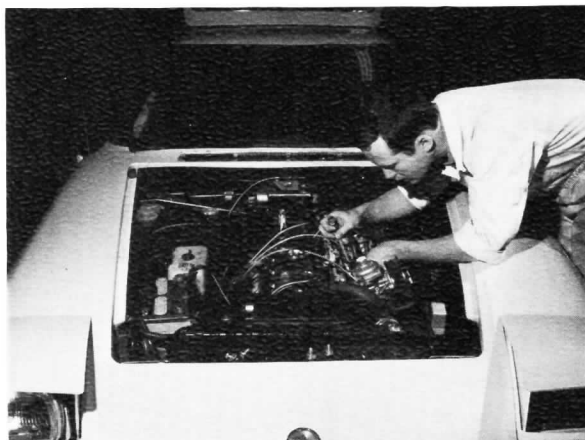
POWER TRAIN

6 cylinder OHV in line engine of 186 cu. in. displacement. Bore of 3.625 in. and stroke of 3.00 in. Develops 160 bhp at 5200 rpm and 190 lb. ft. torque at 3600 rpm.

The power plant is of three point suspension type mounting with two compression — shear type front mountings and one shear type rear. The engine is standard XU1.



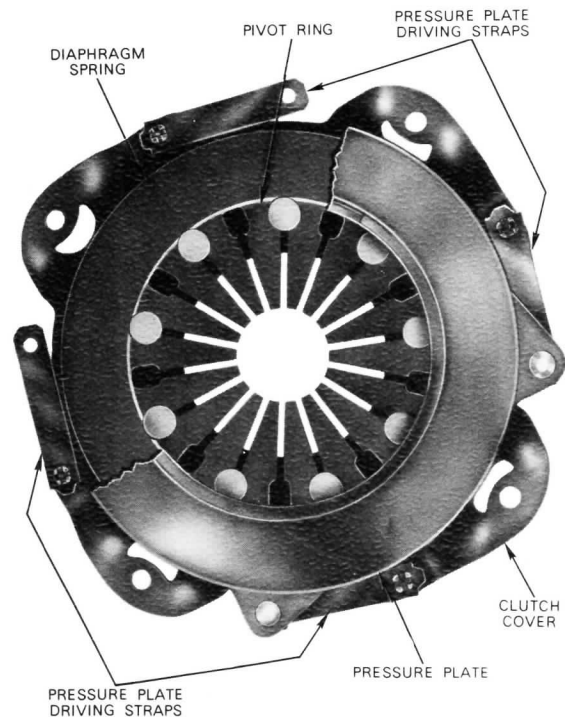
186-X engine



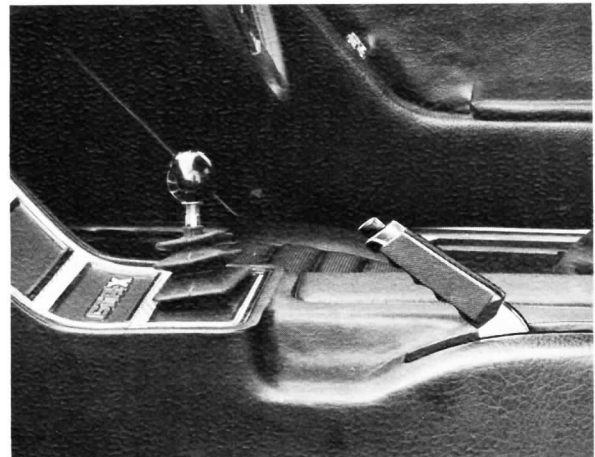
Engine bay

Clutch:

As on current production models with new mechanical clutch control linkage.



Clutch



Floor shift and handbrake

Transmission:

4 speed manual all synchromesh of GMH design with sports shift in centre console. Gear ratios are 2.54 : 1 in first, 1.83 : 1 in second, 1.38 : 1 in third, 1 : 1 in top and 2.54 : 1 in reverse.

BODY

The body is made of fibreglass filled polyester resin, steel reinforced in all high load carrying areas.

Body shell — comprises 3 sections, bonded together:

- The outer shell which incorporates side panels and sills, nose section including front fenders, rear quarters and roof outer panel.
- The underbody which provides also the front and rear inner wheel house panels, inner rear quarter panels as well as the fire wall.
- The roof inner panel which is insulated with polyurethane foam to the outer roof panel prior to bonding.

Roll Bar — a tubular steel roll bar is fitted behind the passenger compartment and is directly connected to the chassis frame for additional strength. Attachment points for seat belts are designed into the roll bar.

Front Windshield — laminated glass with built-in radio antenna, secured to body with silicone sealer.

Rear windshield, door and side quarter glass — heat treated safety glass.

Doors — bonded fibreglass outer and inner panels with cut-outs to permit installation of electrically actuated window glass operating mechanism.

Door handles and key locks — flush fitting safety door handles with lift-up release action. Door locks are anti-burst.

Windshield Wipers:

The wiper/washer system gives wide coverage minimising blind spots. The dual speed wipers are hinged at the engine hood corners and operate on a heavy duty motor to prevent lift. The washer nozzles are incorporated at the end of the wiper blades, thus following the sweep of the blade during the washing cycle.

Head Lamps:

The rectangular, sealed beam headlamps are mounted in moulded fibreglass housings that are tilted open or concealed. The tilting mechanism is a linkage arrangement operated by two vacuum actuators.



Engine Hood:

The engine hood is fibreglass steel reinforced hinged at the front and counter balanced with torque rods. A single remote control lock at the rear is activated from the passenger compartment.



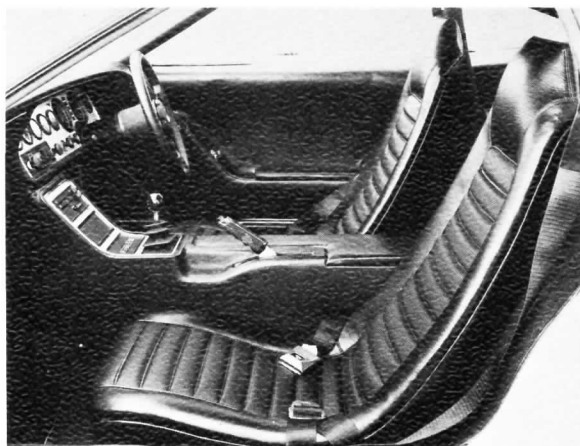
Deck Lid:

Comprised of outer and inner panel incorporating rear glass framing. Balanced and supported by an air spring lock on both sides. The lock is released by cable from the passenger compartment.



INTERIOR

The luxurious interior is safety padded in all critical areas such as instrument panel, centre console, roof and doors. The vehicle is carpeted throughout including luggage compartment and spare wheel stowage.

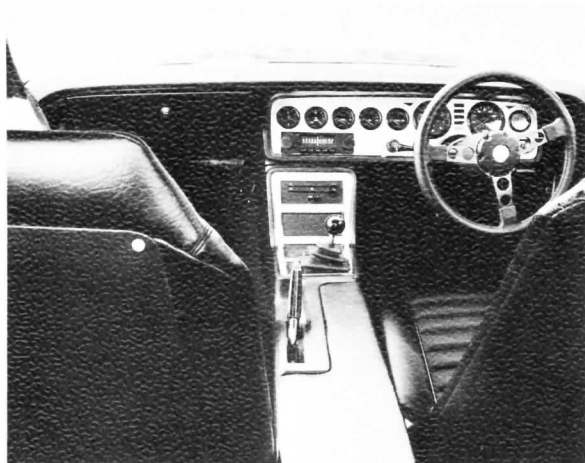


Instrumentation and Controls:

All instruments, radio and controls are mounted on a steel plate carrier to which is bonded an aluminium fascia with an engine turned finish. The whole carrier assembly can be removed readily for service.

The comprehensive sports instrumentation includes:

Speedometer	Warning lights for:
Tachometer	Turn Signals
Radio	High Beam
Electric Clock	Ignition
Ammeter	Hand Brake and/or
Oil Pressure Gauge	Service Brake Failure
Fuel Gauge	Front and Rear Lamp
Temperature Gauge	Failure
Vacuum Gauge	



The light switch, choke control and windshield wiper/washer switch are also located on the instrument carrier. The ignition switch is mounted on the steering column and combined with an anti-theft lock.



Column mounted ignition and lock

Illumination is by individual lights for all instruments and fibre optics or "piped light" for the controls.

Seats:

Fibreglass 'form fitting' seat base reinforced to take ramp type seat adjusters. Adjuster handle pivoted on seat base. Moulded foam pad fitted into seat base and trimmed with Sadlon material. New lap and shoulder seat belts with self-adjusting locking retraction are fitted to roll bar and reinforcements in underbody. Seat design gives excellent lateral support and comfortable driving position.

Ventilation:

Fresh air entering through the shroud grille is ducted to face and foot level outlets on the right and left sides of the instrument panel. The amount of air is controlled with butterfly valves operated by cable controls. Pressure relief valves are fitted to the rear body lock pillar, providing effective flow through ventilation.

Heating and Demisting:

The fan and air inlet duct are mounted on the engine side of the dash panel with the heater core and air distribution duct mounted on the passenger side. Heater, demister and fan controls are located in the centre console.

Ashtray:

The ashtray and cigar lighter are positioned in the centre console below the heater controls.

Glove Box:

A lockable, illuminated glove compartment is provided in the instrument panel on the passenger side.

Interior Lighting:

Floor level lights on driver's and passenger side as well as dome lamp located in roll bar cover are activated by door jamb switches and can also be operated from light switch.

Luggage Compartment:

Adequate space for over-night cases and other equipment provided for.

